

Polysarcus elbursianus in Van Province (East Turkey) (Orthoptera, Tettigoniidae)

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Abstract: *Polysarcus elbursianus* in Van Province (East Turkey) (Orthoptera, Tettigoniidae). *Cesa News* 127: 1-10, 25 figs., 1 tab.

This paper deals with the occurrence, behaviour, and damages of *Polysarcus elbursianus* (Tettigoniidae, Orthoptera) in Bahçesaray (Van Province, East Turkey). Information on the taxonomy, fauna, distribution, morphology of nymphs and adults, habitats, behaviours, and pest reports are given, discussed, and illustrated for the first time in Turkey.

Key words: *Polysarcus elbursianus*, Tettigoniidae, Orthoptera, Turkey, Van, Bahçesaray, fauna, distribution, description, nymph, adult, behaviour, habitat, pest.

Observations and field studies of the authors in some parts of Bahçesaray district have begun in early May of 2016, upon the Mr. Hakan's invitation. In fact, the invasion of specifically unknown bushcricket in some villages of Bahçesaray has already been reported in 2014, in press. Within the framework of the fight against this bushcricket invasion and damages on cultivated plants, the pesticide, “Arrivo 25EC”, prepared with the Cypermethrin (250gr/lit) was used for the natural areas of nearly 10 hectares. After two years, the grasshoppers were observed over a wider territory.

In the present paper, the results of the initial studies² of the authors are given and discussed.

The material studied are preserved in the Research Collection of the CESA, with the code of Cool URI: <http://grbio.org/cool/eaaz-xyfc>

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² First two attempts on the Pterygota fauna of Bahçesaray have been made by the authors (Kemal & Koçak, 2016 a, b).

Taxonomy

The valid specific name of the species was named and described by Uvarov (1930) from northern Iran. The selected holotype is female and preserved in the zoological collection of St. Petersburg (Russia). The second name, *rechingeri* was named and described by Werner (1939) from northern Iran. Its selected holotype is male. It is currently considered as junior synonym of *elbursianus* (Uvarov, 1930).

Fauna and distribution

Until 2013, this species was known only from northern Iran. Warchalowska-Sliwa (2013) reported this species from Kuskunkiran (Van Prov.), and Kars-Horasan road with hesitation. In Bahçesaray, this species is currently known locally, but in masses seriously threatening the cultivating areas of the following villages, Güneyyamaç, Yaşlıkavak, Cevizlibelen, Kaşıkçılar, Ünlüce, Bağcılar, Özbeyli mır.

Description of the nymphs (Figs. 3-7)

The sexual characters are almost invisible externally in the first and second instars of the nymphs (based upon the field observations). The nymphs of both sexes look like each other until the last nymphal instar.

Antennae black, with whitish rings. Eyes brown. Head and body dull black dorsally. Abdomen with white irregular markings forming two broad dorso-lateral longitudinal bands. Pronotum flat, its anterior and posterior marginal areas bright reddish with numerous black spots. Vertex, pronotum, and two abdominal tergites with distinct, pink median stria. Lower part of head, thorax, and abdomen dirty reddish-brown with pale blackish spots. All legs pale yellowish – brown with numerous blackish spots. Tarsi black.

Description of the adults (Figs. 8-25)

Medium sized bushcrickets (Tab. 1).³ Antennae black, with creamy rings basally. Eyes brown. Both sexes similar in general appearance and colouration. Upper part of head, thorax, and abdomen generally black. Pronotum centrally black, anterior margin and posterior half rosy-red; bluish-ivory laterally, with numerous black spots. Middle of transverse groove of pronotum sharply impressed. Whitish striae makes two broad, well marked dorso-lateral bands on abdomen. Thorax and some abdominal segments ivory with black spots laterally. Outer sides of fore-, and middle legs black, otherwise ivory coloured, with black dots. Femorae di-chromatic, black and creamy with black dots. Number of inner and outer spines of hindfemur 8. Tibiae black. Ventral sides of body and legs creamy. Sexual differences as follows; Male: Posterior part of pronotum remarkably enlarged and elevated. Tegmina reaches to 1. abdominal segment, dark yellow. Cerci strongly curved inwards apically; creamy, apical half uniformly black. Supragenital plate black, with two roundish lobes. Subgenital plate creamy, elongated, trapezoidal apically with lateral blackish bands. Female: Pronotum simple. Tegmina shorter, yellow. Ovipositor well developed, dentate apically. Lateral surfaces of ovipositor rugose except in basal 1/3. Apical part of ovipositor almost twice as wide as apex of the hind femora. Ventral margin of ovipositor almost straight. Gonangulum and base of ovipositor with black markings.

In Bahçesaray population of *Polysarcus elbursianus*, light ground colour of most of the males and females are creamy. We consider them the typical form of the species (Figs. 8, 10, 11, 14, 15, 16, 19). However, there are two other colouration types in the populations, which are seen rarely. We name these individuals as forms, namely, f. *viridis* (green form) (Figs. 7, 12, 13), and f. *flavescens* (yellowish form) (Figs. 8, 9, 17, 18, 20).

Table 1 – Measurements of *Polysarcus elbursianus* (in mm.) of some parts of the adults, min: minimum, av: average, max: maximum.

	20 ♂♂			11 ♀♀		
	min	av	max	min	av	max
length of the body	28	33.60	40	26	30.63	35
pronotum	9	9.55	11	9	9.45	10
hindfemur	19	20.50	22	21	21.81	22
ovipositor				17	19.00	20

³ Especially the body size of the prepared material is flexible; therefore, it is unreliable.

Identity

According to the morphological evaluations of the Bahçesaray population, the species looks like to *Polysarcus elbursianus* at the following points. General appearance and colouration of the female are the same with the paratype of *Polysarcus elbursianus* (illustrated).⁴ Cerci of male uniformly black in apical 1/2 or 1/3. Lateral surfaces of ovipositor rugose except in basal 1/3. Apical part of ovipositor almost twice as wide as apex of the hind femora. Ventral margin of ovipositor almost straight (Bei-Bienko, 1954). This species is also identified as “*Polysarcus elbursianus*” (Ünal, pers. comm. in 2014).

Material studied: 20 ♂♂ 11 ♀♀, numerous adults and nymphs observed, photographed and recorded in video (Kemal & Koçak, 2016c).

East Turkey, Van Province, Bahçesaray: Özbeyli mezra 2600m, 8 5 2016, numerous nymphs. Bahçesaray: Garip 2300m 4 6 2016, 15♂♂ 9 ♀♀ (typical), 1♂ (type of *f. flavescens*); same place, 10 6 2016, 3♂♂ 1♀ (typical), 1♀ (type of *f. viridis*); 2km East of Paşaköy, 2040m 10 6 2016; numerous adults and nymphs, spreading to northwest (in coll. Cesa).

Habitat

In the early stages of the nymphs, tragacanthic *Astragalus* steppe at the alpine zone is the main habitat of the species. Vertical distribution of this habitat varies between 2300 and 2600m, depending on the melting of snow cover in early spring (**Fig. 1**). The adults together with the nymphs move by walking on the bare ground, downwards into the valleys, cultivated areas, gardens, orchards of the villages from late May on. According to our observations, the essential habitat of the nymphs is alpine *Astragalus* steppe. The adults prefer the gardens and the orchards of the villages (**Fig. 2**).

Behaviours

The nymphs are strongly gregarious in the early stages. They move in large groups and slowly on the bare earth in the sunshine, but concentrate rapidly among the thorny branches of *Astragalus*, when disturbed. Adults emerge in early June among numerous young nymphs and they move slowly on bare ground in the direction of North-West. Naturally, the adults walk faster than the nymphs, and try quickly to escape, when disturbed. They cannot jump to a long distance like *Uvarovistia* or Pholidoptera. Therefore, its moving can be described as cumbersome. For further visual description of the behaviours, see Kemal & Koçak (2016c).

Pest reports

Bei-Bienko states (1954: 368) “All species [of *Polysarcus*] occur in highlands, on shrubs or dense, rich vegetation. Some species cause damage to agricultural plants, trees and shrubs”. Tarbinskii (1940) reported the damage of larvae of *Polysarcus zacharovi* (ex Bei-Bienko, 1954: 371). When describing *Polysarcus elbursianus* from northern Iran, Uvarov (1930) reported also this species as a vegetable pest. *Polysarcus scutatus* inhabits mountain meadows of South Europe. Sometimes, it multiplies in masses. Pussard (1942) described such a gregarious and blackish populations from southeastern France as var. *azami*. Finally, *Polysarcus denticaudus* from South and South-East Europe, including Thrace, multiplies to large numbers and may cause to serious damage to meadow vegetation, grapevine, fruit and other trees. Such damages have been reported in Romania (Müller, 1924; Zacher, 1925; Bei-Bienko, 1932), in France (Azam, 1909; Maneval, 1926), in Yugoslavia (Zacher, 1926), in northern Italy (Della Beffa, 1948) (ex Bei-Bienko, 1954: 376). In Turkey, *Polysarcus elbursianus* has been reported for the first time in 2014 from the villages Kaşıkçılar and Güneyyamaç (Bahçesaray, Van Province). For the last time, in early May 2016, it has also been reported in very large populations from the alpine zone of these villages, covering more than 20km².

Results

During the observations between early May and early June of 2016, the authors could study the gregarious phase of the species. In other words, all the visual and text information on this species are based upon the gregarious phase. In the last decade, this species was reported from the

⁴ Orthoptera Species File: <http://orthoptera.speciesfile.org/Common/basic/Taxa.aspx?TaxonNameID=1138189>

district two times, in 2014 and in 2016, because of its move and damage to cultivated plants in large numbers. In 2015, no swarm and damage information is reported. This situation brings to mind a possible solitary phase of this species, which is morphologically unknown to us. Bei-Bienko wrote on this subject (1954: 372): “The dark specimens are probably characteristic of the gregarious phase and the uniformly colored ones – the solitary phase”. Under these circumstances, it is planned to realize new observations in 2017 – apparently necessary- on the populations of this species.

On the other hand, we have no information or observation about the place of copulation and laying eggs of this species. For such information, we plan to investigate the Upper Heights of the tragacanthic *Astragalus* steppe above 2500m in July and August. We are of the opinion that the place, where the first nymphs appear in the spring, is most probably the same place, where the eggs laid in summer.

References

- Bei-Bienko, G.Y., 1954.** *Fauna of the U.S.S.R. (Fauna SSSR) Orthoptera (Prymokylye) Vol. II No.2 Tettigonioidea (Kuznechikovye) Phaneropterinae (Podsem. Listovye Kuznechiki).* Zool. Inst. Acad. Sci. U.S.S.R. (New series no.59). Moskva-Leningrad. Transl. From Russian (Israel Program for scientific translations, Jerusalem, 1965).
- Kemal, M. & A.Ö.Koçak, 2016a,** First contribution to the knowledge of the Pterygota fauna of Bahcesaray (Van Province, East Turkey). *Cent. ent. Stud., Misc. Pap.* 161: 1-16, 21 figs. <https://archive.org/details/TextcentreForEntomologicalStudiesAnkaraMiscellaneousPapers161>
- Kemal, M. & A.Ö.Koçak, 2016b,** Second contribution to the knowledge of the Pterygota fauna of Bahcesaray (Van Province, East Turkey). *Cent. ent. Stud., Misc. Pap.* 161: 1-16, 21 figs. <https://archive.org/details/CentreForEntomologicalStudiesAnkaraCesaNewsNr.126>
- Kemal, M. & A.Ö.Koçak, 2016c,** On the gregarious phase and some behaviours of *Polysarcus elbursianus* in Van Province (East Turkey) (Orthoptera, Tettigoniidae). *Iconographia Insectorum (Ser. A).* 12min. 26sec., mpeg2. <https://archive.org/details/OnTheGregariousPhaseAndSomeBehavioursOfPolysarcusElbursianusInVan>
- Uvarov, B.P., 1930,** Studies in the Iranian Orthoptera I. Some new or less-known Tettigoniidae. *Ann. Mus. Zool. Imp. Sci., St. Petersburg* 30: 623-639.
- Warchalowska-Sliwa, E., et al., 2013,** Molecular and classical chromosomal techniques reveal diversity in bushcricket genera of Barbitistini (Orthoptera). *Genome* 56: 667-676.
- Werner, F., 1939,** Über einige Orthopteren aus Iran. *Konowia* 17: 125-137, 8 Abb.



Fig. 1 – Habitat of *Polysarcus elbursianus* in nymphal stages Tragacanthic *Astragalus* steppe at alpine zone, Özbeyli 2600m 8 5 2016, M. Kemal (Cesa).



Fig. 2 – Habitat of adult *Polysarcus elbursianus*. Mountain slopes and cultivated areas around Güneyyamaç village. Photo E. Hakan.



Fig. 3 –Gregarious nymphs of *Polysarcus elbursianus*, concentrated inside of tragacanthic *Astragalus* plant, Özbeyli, photo E.Hakan & H. Tekin.



Figs. 4, 5– *Polysarcus elbursianus*. Left: assumed to be 2. instar, right: 2. & 3. instar of the nymphs altogether. Özbeyli, 8 5 2016. M. Kemal (Cesa)



Figs. 6, 7– *Polysarcus elbursianus*. Left: typical form of the nymph; right: typical forms and *f. viridis*. Photos M. Kemal, E.Hakan & H. Tekin



Figs. 8, 9– *Polysarcus elbursianus*. On the left: two adult females, *f. flavescens* and *f. typicus*. On the right: *f. flavescens*. Photos E.Hakan & H. Tekin



Figs. 10, 11 - *Polysarcus elbursianus*, *f. typicus*, Garip 2300m, male and female. 4 6 2016, M. Kemal (Cesa)



Figs. 12, 13 - *Polysarcus elbursianus*, f. *viridis*, Garip 2300m, male and female, 4 6 2016, M. Kemal (Cesa)



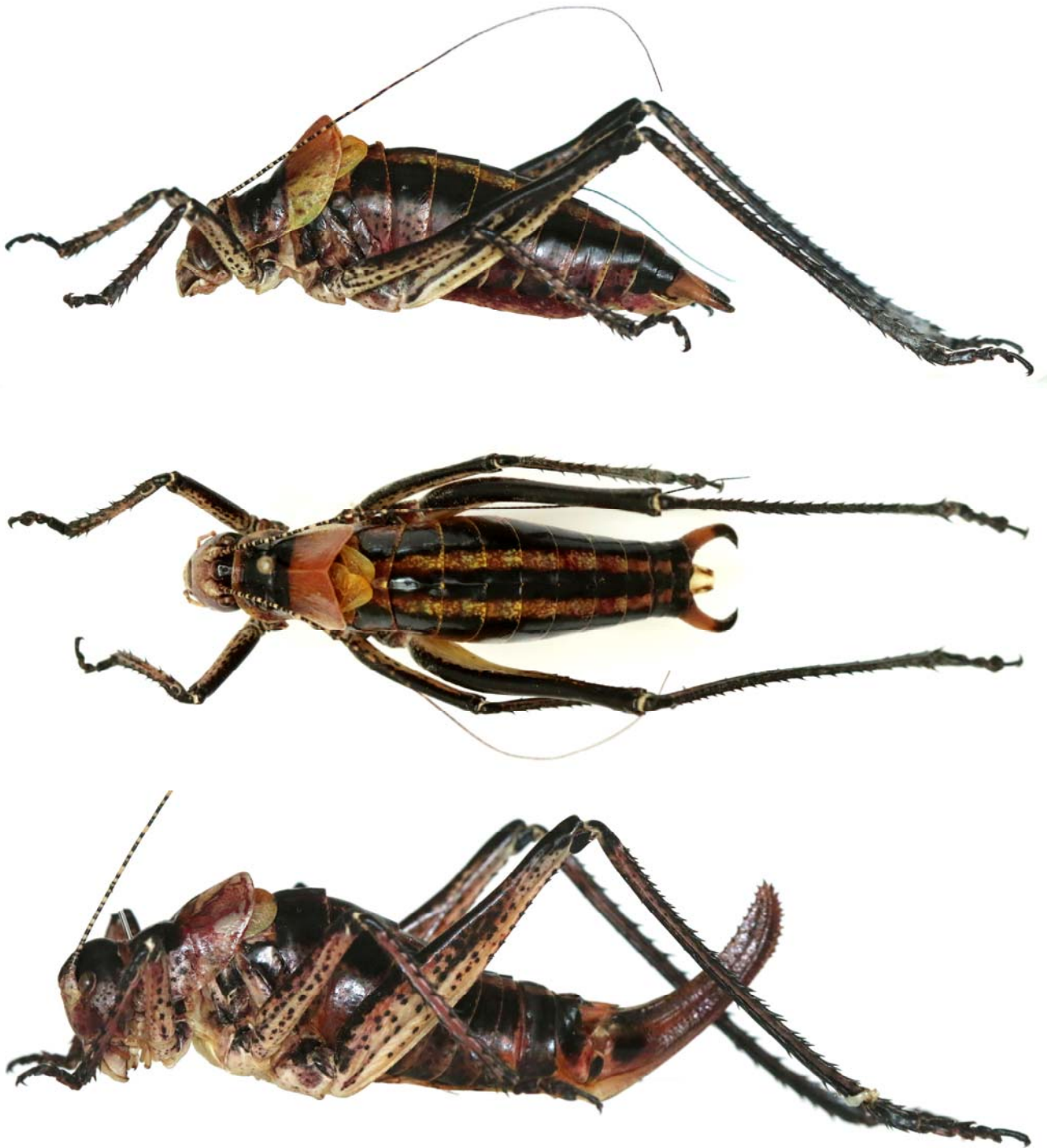
Fig. 14 – Malacophyllous steppe, 2040m, 2km East of Paşaköy. Numerous adults during feeding on various plants, 10 6 2016. M. Kemal (Cesa)



Fig. 15 – Adult *Polysarcus elbursianus* during feeding on *Apiaceae* plants in the malacophyllous steppe, 2040m, 2km East of Paşaköy. 10 6 2016. M. Kemal (Cesa)



Fig. 16 – Adult *Polysarcus elbursianus* during feeding on grasses in the malacophyllous steppe, 2040m, 2km East of Paşaköy. 10 6 2016. M. Kemal (Cesa)



Figs. 17- 19 – *Polysarcus elbursianus* – Top and middle: Lateral and dorsal view of male (f. *flavescens*); below: lateral view of female (f. *typicus*), M.Kemal (Cesa)



Figs. 20-23 – *Polysarcus elbursianus* – Top left: Lateral view of male head and pronotum (type of f. *flavescens*); top right: dorsal view of cerci, sub- and supragenital plates. Below left: frontal view of male head; below right: lateral view of ovipositor, gonangulum, and cerci , M.Kemal (Cesa)



Figs. 24, 25 – Spines of hind femur of female *Polysarcus elbursianus* – Left: inner spines, right: outer spines. M. Kemal (Cesa)

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